SEQUENCE LISTING

<110> Yanagi, Masayuki
Emerson, Suzanne
Bukh, Jens
Purcell, Robert

<120> CLONED GENOME OF INFECTIOUS HEPATITIS C VIRUSES OF GENOTYPE 2a AND USES THEREOF

<130> NIH255.001NP

<140> US 09/980,559
<141> 2002-05-14

<150> PCT/US00/15446
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His Ala Pro Thr Gly Ser Gly Lys Ser Thr Lys Val Pro Val Ala Tyr
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Arg His Leu Ile Phe Cys His Ser Lys Lys Lys Cys Asp Glu Leu Ala
1395 1400 1405

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Thr Phe Thr Ile Thr Thr Gln Ile Val Pro Gln Asp Ala Val Ser Arg
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Ser Gln Arg Arg Gly Arg Thr Gly Arg Gly Arg Leu Gly Ile Tyr Arg
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Gln Tyr Leu Ala Gly Leu Ser Thr Leu Pro Gly Asn Pro Ala Val Ala
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Thr Thr Ile Leu Leu Asn Ile Leu Gly Gly Trp Leu Ala Ser Gln Ile
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Gly Val Tyr Leu Leu Pro Arg Arg Gly Pro Arg Leu Gly Val Arg Ala
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Thr Arg Lys Thr Ser Glu Arg Ser Gln Pro Arg Gly Arg Arg Gln Pro
    50                  55                  60
Ile Pro Lys Asp Arg Arg Ser Thr Gly Lys Ser Trp Gly Lys Pro Gly
65                  70                  75                  80
Tyr Pro Trp Pro Leu Tyr Gly Asn Glu Gly Leu Gly Trp Ala Gly Trp
                85                  90                  95
Leu Leu Ser Pro Arg Gly Ser Arg Pro Ser Trp Gly Pro Asn Asp Pro
            100                 105                 110
Arg His Arg Ser Arg Asn Val Gly Lys Val Ile Asp Thr Leu Thr Cys
        115                 120                 125
Gly Phe Ala Asp Leu Met Gly Tyr Ile Pro Val Val Gly Ala Pro Leu
    130                 135                 140
Gly Gly Val Ala Arg Ala Leu Ala His Gly Val Arg Val Leu Glu Asp
145                 150                 155                 160
Gly Val Asn Phe Ala Thr Gly Asn Leu Pro Gly Cys Ser Phe Ser Ile
                165                 170                 175
Phe Leu Leu Ala Leu Leu Ser Cys Ile Thr Thr Pro Val Ser Ala Ala
            180                 185                 190
Glu Val Lys Asn Ile Ser Thr Gly Tyr Met Val Thr Asn Asp Cys Thr
        195                 200                 205
Asn Asp Ser Ile Thr Trp Gln Leu Gln Ala Ala Val Leu His Val Pro
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Gly Cys Val Pro Cys Glu Lys Val Gly Asn Ala Ser Gln Cys Trp Ile
225                 230                 235                 240
Pro Val Ser Pro Asn Val Ala Val Gln Arg Pro Gly Ala Leu Thr Gln
                245                 250                 255
Gly Leu Arg Thr His Ile Asp Met Val Val Met Ser Ala Thr Leu Cys
            260                 265                 270
Ser Ala Leu Tyr Val Gly Asp Leu Cys Gly Gly Val Met Leu Ala Ala
        275                 280                 285
Gln Met Phe Ile Val Ser Pro Gln His His Trp Phe Val Gln Asp Cys
    290                 295                 300
Asn Cys Ser Ile Tyr Pro Gly Thr Ile Thr Gly His Arg Met Ala Trp
305                 310                 315                 320
Asp Met Met Met Asn Trp Ser Pro Thr Ala Thr Met Ile Leu Ala Tyr
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Ala Met Arg Val Pro Glu Val Ile Ile Asp Ile Ile Ser Gly Ala His
            340                 345                 350
Trp Gly Val Met Phe Gly Leu Ala Tyr Phe Ser Met Gln Gly Ala Trp
        355                 360                 365
Ala Lys Val Val Val Ile Leu Leu Leu Ala Ala Gly Val Asp Ala Arg
    370                 375                 380
Thr His Thr Val Gly Gly Ser Ala Ala Gln Thr Thr Gly Arg Leu Thr
385                 390                 395                 400
Ser Leu Phe Asp Met Gly Pro Arg Gln Lys Ile Gln Leu Val Asn Thr
                405                 410                 415
Asn Gly Ser Trp His Ile Asn Arg Thr Ala Leu Asn Cys Asn Asp Ser
            420                 425                 430
Leu His Thr Gly Phe Ile Ala Ser Leu Phe Tyr Thr His Ser Phe Asn
        435                 440                 445
Ser Ser Gly Cys Pro Glu Arg Met Ser Ala Cys Arg Ser Ile Glu Ala
    450                 455                 460
Phe Arg Val Gly Trp Gly Ala Leu Gln Tyr Glu Asp Asn Val Thr Asn
465                 470                 475                 480
Pro Glu Asp Met Arg Pro Tyr Cys Trp His Tyr Pro Pro Arg Gln Cys
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            500                 505                 510
Pro Ser Pro Val Val Val Gly Thr Thr Asp Arg Leu Gly Ala Pro Thr
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Tyr Thr Trp Gly Glu Asn Glu Thr Asp Val Phe Leu Leu Asn Ser Thr
    530                 535                 540
Arg Pro Pro Leu Gly Ser Trp Phe Gly Cys Thr Trp Met Asn Ser Ser
545                 550                 555                 560
Gly Tyr Thr Lys Thr Cys Gly Ala Pro Pro Cys Arg Thr Arg Ala Asp
                565                 570                 575
Phe Asn Ala Ser Thr Asp Leu Leu Cys Pro Thr Asp Cys Phe Arg Lys
            580                 585                 590
His Pro Asp Thr Thr Tyr Leu Lys Cys Gly Ser Gly Pro Trp Leu Thr
        595                 600                 605
Pro Arg Cys Leu Ile Asp Tyr Pro Tyr Arg Leu Trp His Tyr Pro Cys
    610                 615                 620
Thr Val Asn Tyr Thr Ile Phe Lys Ile Arg Met Tyr Val Gly Gly Val
625                 630                 635                 640
Glu His Arg Leu Thr Ala Ala Cys Asn Phe Thr Arg Gly Asp Arg Cys
                645                 650                 655
Asn Leu Glu Asp Arg Asp Arg Ser Gln Leu Ser Pro Leu Leu His Ser
            660                 665                 670
Thr Thr Glu Trp Ala Ile Leu Pro Cys Ser Tyr Ser Asp Leu Pro Ala
        675                 680                 685
Leu Ser Thr Gly Leu Leu His Leu His Gln Asn Ile Val Asp Val Gln
    690                 695                 700
Phe Met Tyr Gly Leu Ser Pro Ala Leu Thr Lys Tyr Ile Val Arg Trp
705                 710                 715                 720
Glu Trp Val Ile Leu Leu Phe Leu Leu Leu Ala Asp Ala Arg Val Cys
                725                 730                 735
Ala Cys Leu Trp Met Leu Ile Leu Leu Gly Gln Ala Glu Ala Ala Leu
            740                 745                 750
Glu Lys Leu Val Ile Leu His Ala Ala Ser Ala Ala Ser Cys Asn Gly
        755                 760                 765
Phe Leu Tyr Phe Val Ile Phe Phe Val Ala Ala Trp Tyr Ile Lys Gly
    770                 775                 780
Arg Val Val Pro Leu Ala Thr Tyr Ser Leu Thr Gly Leu Trp Ser Phe
785                 790                 795                 800
Ser Leu Leu Leu Leu Ala Leu Pro Gln Gln Ala Tyr Ala Leu Asp Thr
                805                 810                 815
Glu Val Ala Ala Ser Cys Gly Gly Val Val Leu Val Gly Leu Met Ala
            820                 825                 830
Leu Thr Leu Ser Pro Tyr Tyr Lys Arg Tyr Ile Ser Trp Cys Met Trp
        835                 840                 845
Trp Leu Gln Tyr Phe Leu Thr Arg Val Glu Ala Gln Leu His Val Trp
    850                 855                 860
Val Pro Pro Leu Asn Val Arg Gly Gly Arg Asp Ala Val Ile Leu Leu
865                 870                 875                 880
Met Cys Val Val His Pro Thr Leu Val Phe Asp Ile Thr Lys Leu Leu
                885                 890                 895
Leu Ala Ile Phe Gly Pro Leu Trp Ile Leu Gln Ala Ser Leu Leu Lys
            900                 905                 910
Val Pro Tyr Phe Val Arg Val Gln Gly Leu Leu Arg Ile Cys Ala Leu
        915                 920                 925
Ala Arg Lys Ile Ala Gly Gly His Tyr Val Gln Met Ala Ile Ile Lys
    930                 935                 940
Leu Gly Ala Leu Thr Gly Thr Tyr Val Tyr Asn His Leu Thr Pro Leu
945                 950                 955                 960
Arg Asp Trp Ala His Asn Gly Leu Arg Asp Leu Ala Val Ala Val Glu
                965                 970                 975
Pro Val Val Phe Ser Arg Met Glu Thr Lys Leu Ile Thr Trp Gly Ala
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Asp Thr Ala Ala Cys Gly Asp Ile Ile Asn Gly Leu Pro Val Ser Ala
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Arg Arg Gly Gln Glu Ile Leu Leu Gly Pro Ala Asp Gly Met Val Ser
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Lys Gly Trp Arg Leu Leu Ala Pro Ile Thr Ala Tyr Ala Gln Gln Thr
1025                1030                1035                1040
Arg Gly Leu Leu Gly Cys Ile Ile Thr Ser Leu Thr Gly Arg Asp Lys
                1045                1050                1055
Asn Gln Val Glu Gly Glu Val Gln Ile Val Ser Thr Ala Thr Gln Thr
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Phe Leu Ala Thr Cys Ile Asn Gly Val Cys Trp Thr Val Tyr His Gly
        1075                1080                1085
Ala Gly Thr Arg Thr Ile Ala Ser Pro Lys Gly Pro Val Ile Gln Met
    1090                1095                1100
Tyr Thr Asn Val Asp Gln Asp Leu Val Gly Trp Pro Ala Pro Gln Gly
1105                1110                1115                1120
Ser Arg Ser Leu Thr Pro Cys Thr Cys Gly Ser Ser Asp Leu Tyr Leu
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Val Thr Arg His Ala Asp Val Ile Pro Val Arg Arg Arg Gly Asp Ser
            1140                1145                1150
Arg Gly Ser Leu Leu Ser Pro Arg Pro Ile Ser Tyr Leu Lys Gly Ser
        1155                1160                1165
Ser Gly Gly Pro Leu Leu Cys Pro Ala Gly His Ala Val Gly Leu Phe
    1170                1175                1180
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1185                1190                1195                1200
Pro Val Glu Asn Leu Gly Thr Thr Met Arg Ser Pro Val Phe Thr Asp
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Asn Ser Ser Pro Pro Ala Val Pro Gln Ser Phe Gln Val Ala His Leu
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His Ala Pro Thr Gly Ser Gly Lys Ser Thr Lys Val Pro Ala Ala Tyr
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Ala Ala Gln Gly Tyr Lys Val Leu Val Leu Asn Pro Ser Val Ala Ala
    1250                1255                1260
Thr Leu Gly Phe Gly Ala Tyr Met Ser Lys Ala His Gly Val Asp Pro
1265                1270                1275                1280
Asn Ile Arg Thr Gly Val Arg Thr Ile Thr Thr Gly Ser Pro Ile Thr
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Tyr Ser Thr Tyr Gly Lys Phe Leu Ala Asp Gly Gly Cys Ser Gly Gly
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Ala Tyr Asp Ile Ile Ile Cys Asp Glu Cys His Ser Thr Asp Ala Thr
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Ser Ile Leu Gly Ile Gly Thr Val Leu Asp Gln Ala Glu Thr Ala Gly
    1330                1335                1340
Ala Arg Leu Val Val Leu Ala Thr Ala Thr Pro Pro Gly Ser Val Thr
1345                1350                1355                1360
Val Ser His Pro Asn Ile Glu Glu Val Ala Leu Ser Thr Thr Gly Glu
                1365                1370                1375
Ile Pro Phe Tyr Gly Lys Ala Ile Pro Leu Glu Val Ile Lys Gly Gly
            1380                1385                1390
Arg His Leu Ile Phe Cys His Ser Lys Lys Lys Cys Asp Glu Leu Ala
        1395                1400                1405
Ala Lys Leu Val Ala Leu Gly Ile Asn Ala Val Ala Tyr Tyr Arg Gly
    1410                1415                1420
Leu Asp Val Ser Val Ile Pro Thr Ser Gly Asp Val Val Val Val Ser
1425                1430                1435                1440
Thr Asp Ala Leu Met Thr Gly Phe Thr Gly Asp Phe Asp Ser Val Ile
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Asp Cys Asn Thr Cys Val Thr Gln Thr Val Asp Phe Ser Leu Asp Pro
            1460                1465                1470
Thr Phe Thr Ile Glu Thr Thr Thr Leu Pro Gln Asp Ala Val Ser Arg
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Ala Glu Thr Thr Val Arg Leu Arg Ala Tyr Met Asn Thr Pro Gly Leu
1540 1545 1550
Pro Val Cys Gln Asp His Leu Glu Phe Trp Glu Gly Val Phe Thr Gly
1555 1560 1565
Leu Thr His Ile Asp Ala His Phe Leu Ser Gln Thr Lys Gln Ser Gly
1570 1575 1580
Glu Asn Phe Pro Tyr Leu Val Ala Tyr Gln Ala Thr Val Cys Ala Arg
1585 1590 1595 1600
Ala Gln Ala Pro Pro Pro Ser Trp Asp Gln Met Trp Lys Cys Leu Ile
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Arg Leu Lys Pro Thr Leu His Gly Pro Thr Pro Leu Leu Tyr Arg Leu
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Gly Ala Val Gln Asn Glu Val Thr Leu Thr His Pro Ile Thr Lys Tyr
1635 1640 1645
Ile Met Thr Cys Met Ser Ala Asp Leu Glu Val Val Thr Ser Thr Trp
1650 1655 1660
Val Leu Val Gly Gly Val Leu Ala Ala Leu Ala Ala Tyr Cys Leu Ser
1665 1670 1675 1680
Thr Gly Cys Val Val Ile Val Gly Arg Ile Val Leu Ser Gly Lys Pro
1685 1690 1695
Ala Ile Ile Pro Asp Arg Glu Val Leu Tyr Gln Glu Phe Asp Glu Met
1700 1705 1710
Glu Glu Cys Ser Gln His Leu Pro Tyr Ile Glu Gln Gly Met Met Leu
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Ala Glu Gln Phe Lys Gln Lys Ala Leu Gly Leu Leu Gln Thr Ala Ser
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Leu Glu Val Phe Trp Ala Lys His Met Trp Asn Phe Ile Ser Gly Ile
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Gln Tyr Leu Ala Gly Leu Ser Thr Leu Pro Gly Asn Pro Ala Ile Ala
1780 1785 1790
Ser Leu Met Ala Phe Thr Ala Ala Val Thr Ser Pro Leu Thr Thr Gly
1795 1800 1805
Gln Thr Leu Leu Phe Asn Ile Leu Gly Gly Trp Val Ala Ala Gln Leu
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Ala Ala Pro Gly Ala Ala Thr Ala Phe Val Gly Ala Gly Leu Ala Gly
1825 1830 1835 1840
Ala Ala Ile Gly Ser Val Gly Leu Gly Lys Val Leu Val Asp Ile Leu
1845 1850 1855
Ala Gly Tyr Gly Ala Gly Val Ala Gly Ala Leu Val Ala Phe Lys Ile
1860 1865 1870
Met Ser Gly Glu Val Pro Ser Thr Glu Asp Leu Val Asn Leu Leu Pro
1875 1880 1885
Ala Ile Leu Ser Pro Gly Ala Leu Val Val Gly Val Val Cys Ala Ala
1890 1895 1900
Ile Leu Arg Arg His Val Gly Pro Gly Glu Gly Ala Val Gln Trp Met
1905 1910 1915 1920
Asn Arg Leu Ile Ala Phe Ala Ser Arg Gly Asn His Val Ser Pro Thr
1925 1930 1935
His Tyr Val Pro Glu Ser Asp Ala Ala Ala Arg Val Thr Ala Ile Leu
1940 1945 1950
Ser Ser Leu Thr Val Thr Gln Leu Leu Arg Arg Leu His Gln Trp Ile
1955 1960 1965
Ser Ser Glu Cys Thr Thr Pro Cys Ser Gly Ser Trp Leu Arg Asp Ile
1970 1975 1980
Trp Asp Trp Ile Cys Glu Val Leu Ser Asp Phe Lys Thr Trp Leu Lys
1985 1990 1995 2000

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Pro Ile Asn Ala Tyr Thr Thr Gly Pro Cys Thr Pro Leu Pro Ala Pro
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Asn Tyr Lys Phe Ala Leu Trp Arg Val Ser Ala Glu Glu Tyr Val Glu
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Ile Arg Arg Val Gly Asp Phe His Tyr Val Ser Gly Met Thr Thr Asp
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Asn Leu Lys Cys Pro Cys Gln Ile Pro Ser Pro Glu Phe Phe Thr Glu
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Leu Asp Gly Val Arg Leu His Arg Phe Ala Pro Pro Cys Lys Pro Leu
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Ser Val Pro Ala Glu Ile Leu Arg Lys Ser Arg Arg Phe Ala Arg Ala
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Thr Lys Ser Phe Gly Ser Ser Ser Thr Ser Gly Ile Thr Gly Asp Asn
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Ala Leu Ser Asn Ser Leu Leu Arg His His Asn Leu Val Tyr Ser Thr
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Thr Ser Arg Ser Ala Cys Gln Arg Gln Lys Lys Val Thr Phe Asp Arg
2465                2470                2475                2480
Leu Gln Val Leu Asp Ser His Tyr Gln Asp Val Leu Lys Glu Val Lys
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Ser Val Trp Lys Asp Leu Leu Glu Asp Ser Val Thr Pro Ile Asp Thr
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Thr Ile Met Ala Lys Asn Glu Val Phe Cys Val Gln Pro Glu Lys Gly
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Val Cys Glu Lys Met Ala Leu Tyr Asp Val Val Ser Lys Leu Pro Leu
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Phe Ser Tyr Asp Thr Arg Cys Phe Asp Ser Thr Val Thr Glu Ser Asp
2645 2650 2655
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2660 2665 2670
Ala Arg Val Ala Ile Lys Ser Leu Thr Glu Arg Leu Tyr Val Gly Gly
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Pro Leu Thr Asn Ser Arg Gly Glu Asn Cys Gly Tyr Arg Arg Cys Arg
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Ala Gly Tyr Ser Gly Gly Asp Ile Tyr His Ser Val Ser His Ala Arg
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Gly Val Tyr Leu Leu Pro Arg Arg Gly Pro Arg Leu Gly Val Arg Ala
        35                  40                  45
Thr Arg Lys Thr Ser Glu Arg Ser Gln Pro Arg Gly Arg Arg Gln Pro
    50                  55                  60
Ile Pro Lys Asp Arg Arg Ser Thr Gly Lys Ser Trp Gly Lys Pro Gly
65                  70                  75                  80
Tyr Pro Trp Pro Leu Tyr Gly Asn Glu Gly Leu Gly Trp Ala Gly Trp
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Leu Leu Ser Pro Arg Gly Ser Arg Pro Ser Trp Gly Pro Asn Asp Pro
            100                 105                 110
Arg His Arg Ser Arg Asn Val Gly Lys Val Ile Asp Thr Leu Thr Cys
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Gly Phe Ala Asp Leu Met Gly Tyr Ile Pro Val Val Gly Ala Pro Leu
    130                 135                 140
Gly Gly Val Ala Arg Ala Leu Ala His Gly Val Arg Val Leu Glu Asp
145                 150                 155                 160
Gly Val Asn Phe Ala Thr Gly Asn Leu Pro Gly Cys Ser Phe Ser Ile
                165                 170                 175
Phe Leu Leu Ala Leu Leu Ser Cys Ile Thr Thr Pro Val Ser Ala Ala
            180                 185                 190
Glu Val Lys Asn Ile Ser Thr Gly Tyr Met Val Thr Asn Asp Cys Thr
        195                 200                 205
Asn Asp Ser Ile Thr Trp Gln Leu Gln Ala Ala Val Leu His Val Pro
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Gly Cys Val Pro Cys Glu Lys Val Gly Asn Ala Ser Gln Cys Trp Ile
225                 230                 235                 240
Pro Val Ser Pro Asn Val Ala Val Gln Arg Pro Gly Ala Leu Thr Gln
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Gly Leu Arg Thr His Ile Asp Met Val Val Met Ser Ala Thr Leu Cys
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Ser Ala Leu Tyr Val Gly Asp Leu Cys Gly Gly Val Met Leu Ala Ala
        275                 280                 285
Gln Met Phe Ile Val Ser Pro Gln His His Trp Phe Val Gln Asp Cys
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Asp Met Met Met Asn Trp Ser Pro Thr Ala Thr Met Ile Leu Ala Tyr
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Trp Gly Val Met Phe Gly Leu Ala Tyr Phe Ser Met Gln Gly Ala Trp
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Glu His Arg Leu Thr Ala Ala Cys Asn Phe Thr Arg Gly Asp Arg Cys
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Thr Thr Glu Trp Ala Ile Leu Pro Cys Ser Tyr Ser Asp Leu Pro Ala
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Leu Ser Thr Gly Leu Leu His Leu His Gln Asn Ile Val Asp Val Gln
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Arg Trp Val Pro Gly Ala Val Tyr Ala Leu Tyr Gly Met Trp Pro Leu
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Glu Val Ala Ala Ser Cys Gly Gly Val Val Leu Val Gly Leu Met Ala
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Leu Thr Leu Ser Pro Tyr Tyr Lys Arg Tyr Ile Ser Trp Cys Met Trp
        835                 840                 845
Trp Leu Gln Tyr Phe Leu Thr Arg Val Glu Ala Gln Leu His Val Trp
    850                 855                 860
Val Pro Pro Leu Asn Val Arg Gly Gly Arg Asp Ala Val Ile Leu Leu
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Met Cys Val Val His Pro Thr Leu Val Phe Asp Ile Thr Lys Leu Leu
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Ala Lys Leu Val Ala Leu Gly Ile Asn Ala Val Ala Tyr Tyr Arg Gly
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Leu Asp Val Ser Val Ile Pro Thr Ser Gly Asp Val Val Val Val Ser
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Thr Asp Ala Leu Met Thr Gly Phe Thr Gly Asp Phe Asp Ser Val Ile
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Asp Cys Asn Thr Cys Val Thr Gln Thr Val Asp Phe Ser Leu Asp Pro
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Thr Phe Thr Ile Glu Thr Thr Thr Leu Pro Gln Asp Ala Val Ser Arg
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Thr Gln Arg Arg Gly Arg Thr Gly Arg Gly Lys Pro Gly Ile Tyr Arg
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Ala Glu Thr Thr Val Arg Leu Arg Ala Tyr Met Asn Thr Pro Gly Leu
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Pro Val Cys Gln Asp His Leu Glu Phe Trp Glu Gly Val Phe Thr Gly
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Gln Tyr Leu Ala Gly Leu Ser Thr Leu Pro Gly Asn Pro Ala Ile Ala
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Ser Leu Met Ala Phe Thr Ala Ala Val Thr Ser Pro Leu Thr Thr Gly
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Gln Thr Leu Leu Phe Asn Ile Leu Gly Gly Trp Val Ala Ala Gln Leu
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<212> PRT
<213> Hepatitis C virus

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Gly Val Tyr Leu Leu Pro Arg Arg Gly Pro Arg Leu Gly Val Arg Ala
        35                  40                  45
Thr Arg Lys Thr Ser Glu Arg Ser Gln Pro Arg Gly Arg Arg Gln Pro
    50                  55                  60
Ile Pro Lys Asp Arg Arg Ser Thr Gly Lys Ser Trp Gly Lys Pro Gly
65                  70                  75                  80
Tyr Pro Trp Pro Leu Tyr Gly Asn Glu Gly Leu Gly Trp Ala Gly Trp
                85                  90                  95
Leu Leu Ser Pro Arg Gly Ser Arg Pro Ser Trp Gly Pro Asn Asp Pro
            100                 105                 110
Arg His Arg Ser Arg Asn Val Gly Lys Val Ile Asp Thr Leu Thr Cys
        115                 120                 125
Gly Phe Ala Asp Leu Met Gly Tyr Ile Pro Val Val Gly Ala Pro Leu
    130                 135                 140
Gly Gly Val Ala Arg Ala Leu Ala His Gly Val Arg Val Leu Glu Asp
145                 150                 155                 160
Gly Val Asn Phe Ala Thr Gly Asn Leu Pro Gly Cys Ser Phe Ser Ile
                165                 170                 175
Phe Leu Leu Ala Leu Leu Ser Cys Ile Thr Thr Pro Val Ser Ala Ala
            180                 185                 190
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Glu Val Lys Asn Ile Ser Thr Gly Tyr Met Val Thr Asn Asp Cys Thr
        195                 200                 205
Asn Asp Ser Ile Thr Trp Gln Leu Gln Ala Ala Val Leu His Val Pro
    210                 215                 220
Gly Cys Val Pro Cys Glu Lys Val Gly Asn Ala Ser Gln Cys Trp Ile
225                 230                 235                 240
Pro Val Ser Pro Asn Val Ala Val Gln Arg Pro Gly Ala Leu Thr Gln
                245                 250                 255
Gly Leu Arg Thr His Ile Asp Met Val Val Met Ser Ala Thr Leu Cys
            260                 265                 270
Ser Ala Leu Tyr Val Gly Asp Leu Cys Gly Gly Val Met Leu Ala Ala
        275                 280                 285
Gln Met Phe Ile Val Ser Pro Gln His His Trp Phe Val Gln Asp Cys
    290                 295                 300
Asn Cys Ser Ile Tyr Pro Gly Thr Ile Thr Gly His Arg Met Ala Trp
305                 310                 315                 320
Asp Met Met Met Asn Trp Ser Pro Thr Ala Thr Met Ile Leu Ala Tyr
                325                 330                 335
Ala Met Arg Val Pro Glu Val Ile Ile Asp Ile Ile Ser Gly Ala His
            340                 345                 350
Trp Gly Val Met Phe Gly Leu Ala Tyr Phe Ser Met Gln Gly Ala Trp
        355                 360                 365
Ala Lys Val Val Val Ile Leu Leu Leu Ala Ala Gly Val Asp Ala Arg
    370                 375                 380
Thr His Thr Val Gly Gly Ser Ala Ala Gln Thr Thr Gly Arg Leu Thr
385                 390                 395                 400
Ser Leu Phe Asp Met Gly Pro Arg Gln Lys Ile Gln Leu Val Asn Thr
                405                 410                 415
Asn Gly Ser Trp His Ile Asn Arg Thr Ala Leu Asn Cys Asn Asp Ser
            420                 425                 430
Leu His Thr Gly Phe Ile Ala Ser Leu Phe Tyr Thr His Ser Phe Asn
        435                 440                 445
Ser Ser Gly Cys Pro Glu Arg Met Ser Ala Cys Arg Ser Ile Glu Ala
    450                 455                 460
Phe Arg Val Gly Trp Gly Ala Leu Gln Tyr Glu Asp Asn Val Thr Asn
465                 470                 475                 480
Pro Glu Asp Met Arg Pro Tyr Cys Trp His Tyr Pro Pro Arg Gln Cys
                485                 490                 495
Gly Val Val Ser Ala Lys Thr Val Cys Gly Pro Val Tyr Cys Phe Thr
            500                 505                 510
Pro Ser Pro Val Val Val Gly Thr Thr Asp Arg Leu Gly Ala Pro Thr
        515                 520                 525
Tyr Thr Trp Gly Glu Asn Glu Thr Asp Val Phe Leu Leu Asn Ser Thr
    530                 535                 540
Arg Pro Pro Leu Gly Ser Trp Phe Gly Cys Thr Trp Met Asn Ser Ser
545                 550                 555                 560
Gly Tyr Thr Lys Thr Cys Gly Ala Pro Pro Cys Arg Thr Arg Ala Asp
                565                 570                 575
Phe Asn Ala Ser Thr Asp Leu Leu Cys Pro Thr Asp Cys Phe Arg Lys
            580                 585                 590
His Pro Asp Thr Thr Tyr Leu Lys Cys Gly Ser Gly Pro Trp Leu Thr
        595                 600                 605
Pro Arg Cys Leu Ile Asp Tyr Pro Tyr Arg Leu Trp His Tyr Pro Cys
    610                 615                 620
Thr Val Asn Tyr Thr Ile Phe Lys Ile Arg Met Tyr Val Gly Gly Val
625                 630                 635                 640
Glu His Arg Leu Thr Ala Ala Cys Asn Phe Thr Arg Gly Asp Arg Cys
                645                 650                 655
Asn Leu Glu Asp Arg Asp Arg Ser Gln Leu Ser Pro Leu Leu His Ser
            660                 665                 670
Thr Thr Glu Trp Ala Ile Leu Pro Cys Ser Tyr Ser Asp Leu Pro Ala
        675                 680                 685
Leu Ser Thr Gly Leu Leu His Leu His Gln Asn Ile Val Asp Val Gln
```

690 695 700
Phe Met Tyr Gly Leu Ser Pro Ala Leu Thr Lys Tyr Ile Val Arg Trp
705 710 715 720
Glu Trp Val Ile Leu Leu Phe Leu Leu Leu Ala Asp Ala Arg Val Cys
725 730 735
Ala Cys Leu Trp Met Leu Ile Leu Leu Gly Gln Ala Glu Ala Ala Leu
740 745 750
Glu Lys Leu Val Ile Leu His Ala Ala Ser Ala Ala Ser Cys Asn Gly
755 760 765
Phe Leu Tyr Phe Val Ile Phe Phe Val Ala Ala Trp Tyr Ile Lys Gly
770 775 780
Arg Val Val Pro Leu Ala Thr Tyr Ser Leu Thr Gly Leu Trp Ser Phe
785 790 795 800
Ser Leu Leu Leu Leu Ala Leu Pro Gln Gln Ala Tyr Ala Leu Asp Thr
805 810 815
Glu Val Ala Ala Ser Cys Gly Gly Val Val Leu Val Gly Leu Met Ala
820 825 830
Leu Thr Leu Ser Pro Tyr Tyr Lys Arg Tyr Ile Ser Trp Cys Met Trp
835 840 845
Trp Leu Gln Tyr Phe Leu Thr Arg Val Glu Ala Gln Leu His Val Trp
850 855 860
Val Pro Pro Leu Asn Val Arg Gly Gly Arg Asp Ala Val Ile Leu Leu
865 870 875 880
Met Cys Val Val His Pro Thr Leu Val Phe Asp Ile Thr Lys Leu Leu
885 890 895
Leu Ala Ile Phe Gly Pro Leu Trp Ile Leu Gln Ala Ser Leu Leu Lys
900 905 910
Val Pro Tyr Phe Val Arg Val Gln Gly Leu Leu Arg Ile Cys Ala Leu
915 920 925
Ala Arg Lys Ile Ala Gly Gly His Tyr Val Gln Met Ala Ile Ile Lys
930 935 940
Leu Gly Ala Leu Thr Gly Thr Tyr Val Tyr Asn His Leu Thr Pro Leu
945 950 955 960
Arg Asp Trp Ala His Asn Gly Leu Arg Asp Leu Ala Val Ala Val Glu
965 970 975
Pro Val Val Phe Ser Arg Met Glu Thr Lys Leu Ile Thr Trp Gly Ala
980 985 990
Asp Thr Ala Ala Cys Gly Asp Ile Ile Asn Gly Leu Pro Val Ser Ala
995 1000 1005
Arg Arg Gly Gln Glu Ile Leu Leu Gly Pro Ala Asp Gly Met Val Ser
1010 1015 1020
Lys Gly Trp Arg Leu Leu Ala Pro Ile Thr Ala Tyr Ala Gln Gln Thr
1025 1030 1035 1040
Arg Gly Leu Leu Gly Cys Ile Ile Thr Ser Leu Thr Gly Arg Asp Lys
1045 1050 1055
Asn Gln Val Glu Gly Glu Val Gln Ile Val Ser Thr Ala Thr Gln Thr
1060 1065 1070
Phe Leu Ala Thr Cys Ile Asn Gly Val Cys Trp Thr Val Tyr His Gly
1075 1080 1085
Ala Gly Thr Arg Thr Ile Ala Ser Pro Lys Gly Pro Val Ile Gln Met
1090 1095 1100
Tyr Thr Asn Val Asp Gln Asp Leu Val Gly Trp Pro Ala Pro Gln Gly
1105 1110 1115 1120
Ser Arg Ser Leu Thr Pro Cys Thr Cys Gly Ser Ser Asp Leu Tyr Leu
1125 1130 1135
Val Thr Arg His Ala Asp Val Ile Pro Val Arg Arg Arg Gly Asp Ser
1140 1145 1150
Arg Gly Ser Leu Leu Ser Pro Arg Pro Ile Ser Tyr Leu Lys Gly Ser
1155 1160 1165
Ser Gly Gly Pro Leu Leu Cys Pro Ala Gly His Ala Val Gly Leu Phe
1170 1175 1180
Arg Ala Ala Val Cys Thr Arg Gly Val Ala Lys Ala Val Asp Phe Ile
1185 1190 1195 1200

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Pro Val Glu Asn Leu Gly Thr Thr Met Arg Ser Pro Val Phe Thr Asp
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Asn Ser Ser Pro Pro Ala Val Pro Gln Ser Phe Gln Val Ala His Leu
            1220                1225                1230
His Ala Pro Thr Gly Ser Gly Lys Ser Thr Lys Val Pro Ala Ala Tyr
        1235                1240                1245
Ala Ala Gln Gly Tyr Lys Val Leu Val Leu Asn Pro Ser Val Ala Ala
    1250                1255                1260
Thr Leu Gly Phe Gly Ala Tyr Met Ser Lys Ala His Gly Val Asp Pro
1265                1270                1275                1280
Asn Ile Arg Thr Gly Val Arg Thr Ile Thr Thr Gly Ser Pro Ile Thr
                1285                1290                1295
Tyr Ser Thr Tyr Gly Lys Phe Leu Ala Asp Gly Gly Cys Ser Gly Gly
            1300                1305                1310
Ala Tyr Asp Ile Ile Ile Cys Asp Glu Cys His Ser Thr Asp Ala Thr
        1315                1320                1325
Ser Ile Leu Gly Ile Gly Thr Val Leu Asp Gln Ala Glu Thr Ala Gly
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Ala Arg Leu Val Val Leu Ala Thr Ala Thr Pro Pro Gly Ser Val Thr
1345                1350                1355                1360
Val Ser His Pro Asn Ile Glu Glu Val Ala Leu Ser Thr Thr Gly Glu
                1365                1370                1375
Ile Pro Phe Tyr Gly Lys Ala Ile Pro Leu Glu Val Ile Lys Gly Gly
            1380                1385                1390
Arg His Leu Ile Phe Cys His Ser Lys Lys Lys Cys Asp Glu Leu Ala
        1395                1400                1405
Ala Lys Leu Val Ala Leu Gly Ile Asn Ala Val Ala Tyr Tyr Arg Gly
    1410                1415                1420
Leu Asp Val Ser Val Ile Pro Thr Ser Gly Asp Val Val Val Val Ser
1425                1430                1435                1440
Thr Asp Ala Leu Met Thr Gly Phe Thr Gly Asp Phe Asp Ser Val Ile
                1445                1450                1455
Asp Cys Asn Thr Cys Val Thr Gln Thr Val Asp Phe Ser Leu Asp Pro
            1460                1465                1470
Thr Phe Thr Ile Glu Thr Thr Thr Leu Pro Gln Asp Ala Val Ser Arg
        1475                1480                1485
Thr Gln Arg Arg Gly Arg Thr Gly Arg Gly Lys Pro Gly Ile Tyr Arg
    1490                1495                1500
Phe Val Ala Pro Gly Glu Arg Pro Ser Gly Met Phe Asp Ser Ser Val
1505                1510                1515                1520
Leu Cys Glu Cys Tyr Asp Ala Gly Cys Ala Trp Tyr Glu Leu Thr Pro
                1525                1530                1535
Ala Glu Thr Thr Val Arg Leu Arg Ala Tyr Met Asn Thr Pro Gly Leu
            1540                1545                1550
Pro Val Cys Gln Asp His Leu Glu Phe Trp Glu Gly Val Phe Thr Gly
        1555                1560                1565
Leu Thr His Ile Asp Ala His Phe Leu Ser Gln Thr Lys Gln Ser Gly
    1570                1575                1580
Glu Asn Phe Pro Tyr Leu Val Ala Tyr Gln Ala Thr Val Cys Ala Arg
1585                1590                1595                1600
Ala Gln Ala Pro Pro Pro Ser Trp Asp Gln Met Trp Lys Cys Leu Ile
                1605                1610                1615
Arg Leu Lys Pro Thr Leu His Gly Pro Thr Pro Leu Leu Tyr Arg Leu
            1620                1625                1630
Gly Ala Val Gln Asn Glu Val Thr Leu Thr His Pro Ile Thr Lys Tyr
        1635                1640                1645
Ile Met Thr Cys Met Ser Ala Asp Leu Glu Val Val Thr Ser Thr Trp
    1650                1655                1660
Val Leu Val Gly Gly Val Leu Ala Ala Leu Ala Ala Tyr Cys Leu Ser
1665                1670                1675                1680
Thr Gly Cys Val Val Ile Val Gly Arg Ile Val Leu Ser Gly Lys Pro
                1685                1690                1695
Ala Ile Ile Pro Asp Arg Glu Val Leu Tyr Gln Glu Phe Asp Glu Met
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            1700                1705                1710
Glu Glu Cys Ser Gln His Leu Pro Tyr Ile Glu Gln Gly Met Met Leu
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Ala Glu Gln Phe Lys Gln Lys Ala Leu Gly Leu Leu Gln Thr Ala Ser
    1730                1735                1740
Arg His Ala Glu Val Ile Thr Pro Ala Val Gln Thr Asn Trp Gln Lys
1745                1750                1755                1760
Leu Glu Val Phe Trp Ala Lys His Met Trp Asn Phe Ile Ser Gly Ile
                1765                1770                1775
Gln Tyr Leu Ala Gly Leu Ser Thr Leu Pro Gly Asn Pro Ala Ile Ala
            1780                1785                1790
Ser Leu Met Ala Phe Thr Ala Ala Val Thr Ser Pro Leu Thr Thr Gly
        1795                1800                1805
Gln Thr Leu Leu Phe Asn Ile Leu Gly Gly Trp Val Ala Ala Gln Leu
    1810                1815                1820
Ala Ala Pro Gly Ala Ala Thr Ala Phe Val Gly Ala Gly Leu Ala Gly
1825                1830                1835                1840
Ala Ala Ile Gly Ser Val Gly Leu Gly Lys Val Leu Val Asp Ile Leu
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Ala Gly Tyr Gly Ala Gly Val Ala Gly Ala Leu Val Ala Phe Lys Ile
            1860                1865                1870
Met Ser Gly Glu Val Pro Ser Thr Glu Asp Leu Val Asn Leu Leu Pro
        1875                1880                1885
Ala Ile Leu Ser Pro Gly Ala Leu Val Val Gly Val Val Cys Ala Ala
    1890                1895                1900
Ile Leu Arg Arg His Val Gly Pro Gly Glu Gly Ala Val Gln Trp Met
1905                1910                1915                1920
Asn Arg Leu Ile Ala Phe Ala Ser Arg Gly Asn His Val Ser Pro Thr
                1925                1930                1935
His Tyr Val Pro Glu Ser Asp Ala Ala Ala Arg Val Thr Ala Ile Leu
            1940                1945                1950
Ser Ser Leu Thr Val Thr Gln Leu Leu Arg Arg Leu His Gln Trp Ile
        1955                1960                1965
Ser Ser Glu Cys Thr Thr Pro Cys Ser Gly Ser Trp Leu Arg Asp Ile
    1970                1975                1980
Trp Asp Trp Ile Cys Glu Val Leu Ser Asp Phe Lys Thr Trp Leu Lys
1985                1990                1995                2000
Ala Lys Leu Met Pro Gln Leu Pro Gly Ile Pro Phe Val Ser Cys Gln
                2005                2010                2015
Arg Gly Tyr Arg Gly Val Trp Arg Gly Asp Gly Ile Met His Thr Arg
            2020                2025                2030
Cys His Cys Gly Ala Glu Ile Thr Gly His Val Lys Asn Gly Thr Met
        2035                2040                2045
Arg Ile Val Gly Pro Arg Thr Cys Arg Asn Met Trp Ser Gly Thr Phe
    2050                2055                2060
Pro Ile Asn Ala Tyr Thr Thr Gly Pro Cys Thr Pro Leu Pro Ala Pro
2065                2070                2075                2080
Asn Tyr Lys Phe Ala Leu Trp Arg Val Ser Ala Glu Glu Tyr Val Glu
                2085                2090                2095
Ile Arg Arg Val Gly Asp Phe His Tyr Val Ser Gly Met Thr Thr Asp
            2100                2105                2110
Asn Leu Lys Cys Pro Cys Gln Ile Pro Ser Pro Glu Phe Phe Thr Glu
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Leu Asp Gly Val Arg Leu His Arg Phe Ala Pro Pro Cys Lys Pro Leu
    2130                2135                2140
Leu Arg Glu Glu Val Ser Phe Arg Val Gly Leu His Glu Tyr Pro Val
2145                2150                2155                2160
Gly Ser Gln Leu Pro Cys Glu Pro Glu Pro Asp Val Ala Val Leu Thr
                2165                2170                2175
Ser Met Leu Thr Asp Pro Ser His Ile Thr Ala Glu Ala Ala Gly Arg
            2180                2185                2190
Arg Leu Ala Arg Gly Ser Pro Pro Ser Met Ala Ser Ser Ser Ala Ser
        2195                2200                2205
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Met Gly Gly Asn Ile Thr Arg Val Glu Ser Glu Asn Lys Val Val Ile
2245 2250 2255
Leu Asp Ser Phe Asp Pro Leu Val Ala Glu Glu Asp Glu Arg Glu Val
2260 2265 2270
Ser Val Pro Ala Glu Ile Leu Arg Lys Ser Arg Arg Phe Ala Arg Ala
2275 2280 2285
Leu Pro Val Trp Ala Arg Pro Asp Tyr Asn Pro Pro Leu Val Glu Thr
2290 2295 2300
Trp Lys Lys Pro Asp Tyr Glu Pro Pro Val Val His Gly Cys Pro Leu
2305 2310 2315 2320
Pro Pro Pro Arg Ser Pro Pro Val Pro Pro Pro Arg Lys Lys Arg Thr
2325 2330 2335
Val Val Leu Thr Glu Ser Thr Leu Ser Thr Ala Leu Ala Glu Leu Ala
2340 2345 2350
Thr Lys Ser Phe Gly Ser Ser Ser Thr Ser Gly Ile Thr Gly Asp Asn
2355 2360 2365
Thr Thr Thr Ser Ser Glu Pro Ala Pro Ser Gly Cys Pro Pro Asp Ser
2370 2375 2380
Asp Val Glu Ser Tyr Ser Ser Met Pro Pro Leu Glu Gly Glu Pro Gly
2385 2390 2395 2400
Asp Pro Asp Leu Ser Asp Gly Ser Trp Ser Thr Val Ser Ser Gly Ala
2405 2410 2415
Asp Thr Glu Asp Val Val Cys Cys Ser Met Ser Tyr Ser Trp Thr Gly
2420 2425 2430
Ala Leu Val Thr Pro Cys Ala Ala Glu Glu Gln Lys Leu Pro Ile Asn
2435 2440 2445
Ala Leu Ser Asn Ser Leu Leu Arg His His Asn Leu Val Tyr Ser Thr
2450 2455 2460
Thr Ser Arg Ser Ala Cys Gln Arg Gln Lys Lys Val Thr Phe Asp Arg
2465 2470 2475 2480
Leu Gln Val Leu Asp Ser His Tyr Gln Asp Val Leu Lys Glu Val Lys
2485 2490 2495
Ala Ala Ala Ser Lys Val Lys Ala Asn Leu Leu Ser Val Glu Glu Ala
2500 2505 2510
Cys Ser Leu Thr Pro Pro His Ser Ala Lys Ser Lys Phe Gly Tyr Gly
2515 2520 2525
Ala Lys Asp Val Arg Cys His Ala Arg Lys Ala Val Ala His Ile Asn
2530 2535 2540
Ser Val Trp Lys Asp Leu Leu Glu Asp Ser Val Thr Pro Ile Asp Thr
2545 2550 2555 2560
Thr Ile Met Ala Lys Asn Glu Val Phe Cys Val Gln Pro Glu Lys Gly
2565 2570 2575
Gly Arg Lys Pro Ala Arg Leu Ile Val Phe Pro Asp Leu Gly Val Arg
2580 2585 2590
Val Cys Glu Lys Met Ala Leu Tyr Asp Val Val Ser Lys Leu Pro Leu
2595 2600 2605
Ala Val Met Gly Ser Ser Tyr Gly Phe Gln Tyr Ser Pro Gly Gln Arg
2610 2615 2620
Val Glu Phe Leu Val Gln Ala Trp Lys Ser Lys Lys Thr Pro Met Gly
2625 2630 2635 2640
Phe Ser Tyr Asp Thr Arg Cys Phe Asp Ser Thr Val Thr Glu Ser Asp
2645 2650 2655
Ile Arg Thr Glu Glu Ala Ile Tyr Gln Cys Cys Asp Leu Asp Pro Gln
2660 2665 2670
Ala Arg Val Ala Ile Lys Ser Leu Thr Glu Arg Leu Tyr Val Gly Gly
2675 2680 2685
Pro Leu Thr Asn Ser Arg Gly Glu Asn Cys Gly Tyr Arg Arg Cys Arg
2690 2695 2700
Ala Ser Gly Val Leu Thr Thr Ser Cys Gly Asn Thr Leu Thr Cys Tyr

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Ile Lys Ala Arg Ala Ala Cys Arg Ala Ala Gly Leu Gln Asp Cys Thr
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Met Leu Val Cys Gly Asp Asp Leu Val Val Ile Cys Glu Ser Ala Gly
2740 2745 2750
Val Gln Glu Asp Ala Ala Ser Leu Arg Ala Phe Thr Glu Ala Met Thr
2755 2760 2765
Arg Tyr Ser Ala Pro Pro Gly Asp Pro Pro Gln Pro Glu Tyr Asp Leu
2770 2775 2780
Glu Leu Ile Thr Ser Cys Ser Ser Asn Val Ser Val Ala His Asp Gly
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Ala Gly Lys Arg Val Tyr Tyr Leu Thr Arg Asp Pro Thr Thr Pro Leu
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Ala Arg Ala Ala Trp Glu Thr Ala Arg His Thr Pro Val Asn Ser Trp
2820 2825 2830
Leu Gly Asn Ile Ile Met Phe Ala Pro Thr Leu Trp Ala Arg Met Ile
2835 2840 2845
Leu Met Thr His Phe Phe Ser Val Leu Ile Ala Arg Asp Gln Leu Glu
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Ser Leu His Ser Tyr Ser Pro Gly Glu Ile Asn Arg Val Ala Ala Cys
2900 2905 2910
Leu Arg Lys Leu Gly Val Pro Pro Leu Arg Ala Trp Arg His Arg Ala
2915 2920 2925
Arg Ser Val Arg Ala Arg Leu Leu Ser Arg Gly Gly Arg Ala Ala Ile
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Cys Gly Lys Tyr Leu Phe Asn Trp Ala Val Arg Thr Lys Leu Lys Leu
2945 2950 2955 2960
Thr Pro Ile Ala Ala Ala Gly Arg Leu Asp Leu Ser Gly Trp Phe Thr
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Ala Gly Tyr Ser Gly Gly Asp Ile Tyr His Ser Val Ser His Ala Arg
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<212> PRT
<213> Hepatitis C virus

<400> 10

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Gly Val Tyr Leu Leu Pro Arg Arg Gly Pro Arg Leu Gly Val Arg Ala
        35                  40                  45
Thr Arg Lys Thr Ser Glu Arg Ser Gln Pro Arg Gly Arg Arg Gln Pro
    50                  55                  60
Ile Pro Lys Asp Arg Arg Ser Thr Gly Lys Ser Trp Gly Lys Pro Gly
65                  70                  75                  80
Tyr Pro Trp Pro Leu Tyr Gly Asn Glu Gly Leu Gly Trp Ala Gly Trp
                85                  90                  95
Leu Leu Ser Pro Arg Gly Ser Arg Pro Ser Trp Gly Pro Asn Asp Pro
            100                 105                 110
Arg His Arg Ser Arg Asn Val Gly Lys Val Ile Asp Thr Leu Thr Cys
        115                 120                 125
Gly Phe Ala Asp Leu Met Gly Tyr Ile Pro Val Val Gly Ala Pro Leu
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Pro Val Ser Pro Asn Val Ala Val Gln Arg Pro Gly Ala Leu Thr Gln
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Trp Leu Gln Tyr Phe Leu Thr Arg Val Glu Ala Gln Leu His Val Trp
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Val Pro Pro Leu Asn Val Arg Gly Gly Arg Asp Ala Val Ile Leu Leu
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Met Cys Val Val His Pro Thr Leu Val Phe Asp Ile Thr Lys Leu Leu
                885                 890                 895
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Val Pro Tyr Phe Val Arg Val Gln Gly Leu Leu Arg Ile Cys Ala Leu
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Ala Arg Lys Ile Ala Gly Gly His Tyr Val Gln Met Ala Ile Ile Lys
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Leu Gly Ala Leu Thr Gly Thr Tyr Val Tyr Asn His Leu Thr Pro Leu
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1665                1670                1675                1680
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                1685                1690                1695
Ala Ile Ile Pro Asp Arg Glu Val Leu Tyr Gln Glu Phe Asp Glu Met
            1700                1705                1710
Glu Glu Cys Ser Gln His Leu Pro Tyr Ile Glu Gln Gly Met Met Leu
        1715                1720                1725
Ala Glu Gln Phe Lys Gln Lys Ala Leu Gly Leu Leu Gln Thr Ala Ser
    1730                1735                1740
Arg His Ala Glu Val Ile Thr Pro Ala Val Gln Thr Asn Trp Gln Lys
1745                1750                1755                1760
Leu Glu Val Phe Trp Ala Lys His Met Trp Asn Phe Ile Ser Gly Ile
                1765                1770                1775
Gln Tyr Leu Ala Gly Leu Ser Thr Leu Pro Gly Asn Pro Ala Ile Ala
            1780                1785                1790
Ser Leu Met Ala Phe Thr Ala Ala Val Thr Ser Pro Leu Thr Thr Gly
        1795                1800                1805
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Gln Thr Leu Leu Phe Asn Ile Leu Gly Gly Trp Val Ala Ala Gln Leu
    1810                1815                1820
Ala Ala Pro Gly Ala Ala Thr Ala Phe Val Gly Ala Gly Leu Ala Gly
1825                1830                1835                1840
Ala Ala Ile Gly Ser Val Gly Leu Gly Lys Val Leu Val Asp Ile Leu
                1845                1850                1855
Ala Gly Tyr Gly Ala Gly Val Ala Gly Ala Leu Val Ala Phe Lys Ile
            1860                1865                1870
Met Ser Gly Glu Val Pro Ser Thr Glu Asp Leu Val Asn Leu Leu Pro
        1875                1880                1885
Ala Ile Leu Ser Pro Gly Ala Leu Val Val Gly Val Val Cys Ala Ala
    1890                1895                1900
Ile Leu Arg Arg His Val Gly Pro Gly Glu Gly Ala Val Gln Trp Met
1905                1910                1915                1920
Asn Arg Leu Ile Ala Phe Ala Ser Arg Gly Asn His Val Ser Pro Thr
                1925                1930                1935
His Tyr Val Pro Glu Ser Asp Ala Ala Ala Arg Val Thr Ala Ile Leu
            1940                1945                1950
Ser Ser Leu Thr Val Thr Gln Leu Leu Arg Arg Leu His Gln Trp Ile
        1955                1960                1965
Ser Ser Glu Cys Thr Thr Pro Cys Ser Gly Ser Trp Leu Arg Asp Ile
    1970                1975                1980
Trp Asp Trp Ile Cys Glu Val Leu Ser Asp Phe Lys Thr Trp Leu Lys
1985                1990                1995                2000
Ala Lys Leu Met Pro Gln Leu Pro Gly Ile Pro Phe Val Ser Cys Gln
                2005                2010                2015
Arg Gly Tyr Arg Gly Val Trp Arg Gly Asp Gly Ile Met His Thr Arg
            2020                2025                2030
Cys His Cys Gly Ala Glu Ile Thr Gly His Val Lys Asn Gly Thr Met
        2035                2040                2045
Arg Ile Val Gly Pro Arg Thr Cys Arg Asn Met Trp Ser Gly Thr Phe
    2050                2055                2060
Pro Ile Asn Ala Tyr Thr Thr Gly Pro Cys Thr Pro Leu Pro Ala Pro
2065                2070                2075                2080
Asn Tyr Lys Phe Ala Leu Trp Arg Val Ser Ala Glu Glu Tyr Val Glu
                2085                2090                2095
Ile Arg Arg Val Gly Asp Phe His Tyr Val Ser Gly Met Thr Thr Asp
            2100                2105                2110
Asn Leu Lys Cys Pro Cys Gln Ile Pro Ser Pro Glu Phe Phe Thr Glu
        2115                2120                2125
Leu Asp Gly Val Arg Leu His Arg Phe Ala Pro Pro Cys Lys Pro Leu
    2130                2135                2140
Leu Arg Glu Glu Val Ser Phe Arg Val Gly Leu His Glu Tyr Pro Val
2145                2150                2155                2160
Gly Ser Gln Leu Pro Cys Glu Pro Glu Pro Asp Val Ala Val Leu Thr
                2165                2170                2175
Ser Met Leu Thr Asp Pro Ser His Ile Thr Ala Glu Ala Ala Gly Arg
            2180                2185                2190
Arg Leu Ala Arg Gly Ser Pro Pro Ser Met Ala Ser Ser Ser Ala Ser
        2195                2200                2205
Gln Leu Ser Ala Pro Ser Leu Lys Ala Thr Cys Thr Ala Asn His Asp
    2210                2215                2220
Ser Pro Asp Ala Glu Leu Ile Glu Ala Asn Leu Leu Trp Arg Gln Glu
2225                2230                2235                2240
Met Gly Gly Asn Ile Thr Arg Val Glu Ser Glu Asn Lys Val Val Ile
                2245                2250                2255
Leu Asp Ser Phe Asp Pro Leu Val Ala Glu Glu Asp Glu Arg Glu Val
            2260                2265                2270
Ser Val Pro Ala Glu Ile Leu Arg Lys Ser Arg Arg Phe Ala Arg Ala
        2275                2280                2285
Leu Pro Val Trp Ala Arg Pro Asp Tyr Asn Pro Pro Leu Val Glu Thr
    2290                2295                2300
Trp Lys Lys Pro Asp Tyr Glu Pro Pro Val Val His Gly Cys Pro Leu
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2305 2310 2315 2320
Pro Pro Pro Arg Ser Pro Pro Val Pro Pro Pro Arg Lys Lys Arg Thr
2325 2330 2335
Val Val Leu Thr Glu Ser Thr Leu Ser Thr Ala Leu Ala Glu Leu Ala
2340 2345 2350
Thr Lys Ser Phe Gly Ser Ser Ser Thr Ser Gly Ile Thr Gly Asp Asn
2355 2360 2365
Thr Thr Thr Ser Ser Glu Pro Ala Pro Ser Gly Cys Pro Pro Asp Ser
2370 2375 2380
Asp Val Glu Ser Tyr Ser Ser Met Pro Pro Leu Glu Gly Glu Pro Gly
2385 2390 2395 2400
Asp Pro Asp Leu Ser Asp Gly Ser Trp Ser Thr Val Ser Ser Gly Ala
2405 2410 2415
Asp Thr Glu Asp Val Val Cys Cys Ser Met Ser Tyr Ser Trp Thr Gly
2420 2425 2430
Ala Leu Val Thr Pro Cys Ala Ala Glu Glu Gln Lys Leu Pro Ile Asn
2435 2440 2445
Ala Leu Ser Asn Ser Leu Leu Arg His His Asn Leu Val Tyr Ser Thr
2450 2455 2460
Thr Ser Arg Ser Ala Cys Gln Arg Gln Lys Lys Val Thr Phe Asp Arg
2465 2470 2475 2480
Leu Gln Val Leu Asp Ser His Tyr Gln Asp Val Leu Lys Glu Val Lys
2485 2490 2495
Ala Ala Ala Ser Lys Val Lys Ala Asn Leu Leu Ser Val Glu Glu Ala
2500 2505 2510
Cys Ser Leu Thr Pro Pro His Ser Ala Lys Ser Lys Phe Gly Tyr Gly
2515 2520 2525
Ala Lys Asp Val Arg Cys His Ala Arg Lys Ala Val Ala His Ile Asn
2530 2535 2540
Ser Val Trp Lys Asp Leu Leu Glu Asp Ser Val Thr Pro Ile Asp Thr
2545 2550 2555 2560
Thr Ile Met Ala Lys Asn Glu Val Phe Cys Val Gln Pro Glu Lys Gly
2565 2570 2575
Gly Arg Lys Pro Ala Arg Leu Ile Val Phe Pro Asp Leu Gly Val Arg
2580 2585 2590
Val Cys Glu Lys Met Ala Leu Tyr Asp Val Val Ser Lys Leu Pro Leu
2595 2600 2605
Ala Val Met Gly Ser Ser Tyr Gly Phe Gln Tyr Ser Pro Gly Gln Arg
2610 2615 2620
Val Glu Phe Leu Val Gln Ala Trp Lys Ser Lys Lys Thr Pro Met Gly
2625 2630 2635 2640
Phe Ser Tyr Asp Thr Arg Cys Phe Asp Ser Thr Val Thr Glu Ser Asp
2645 2650 2655
Ile Arg Thr Glu Glu Ala Ile Tyr Gln Cys Cys Asp Leu Asp Pro Gln
2660 2665 2670
Ala Arg Val Ala Ile Lys Ser Leu Thr Glu Arg Leu Tyr Val Gly Gly
2675 2680 2685
Pro Leu Thr Asn Ser Arg Gly Glu Asn Cys Gly Tyr Arg Arg Cys Arg
2690 2695 2700
Ala Ser Gly Val Leu Thr Thr Ser Cys Gly Asn Thr Leu Thr Cys Tyr
2705 2710 2715 2720
Ile Lys Ala Arg Ala Ala Cys Arg Ala Ala Gly Leu Gln Asp Cys Thr
2725 2730 2735
Met Leu Val Cys Gly Asp Asp Leu Val Val Ile Cys Glu Ser Ala Gly
2740 2745 2750
Val Gln Glu Asp Ala Ala Ser Leu Arg Ala Phe Thr Glu Ala Met Thr
2755 2760 2765
Arg Tyr Ser Ala Pro Pro Gly Asp Pro Pro Gln Pro Glu Tyr Asp Leu
2770 2775 2780
Glu Leu Ile Thr Ser Cys Ser Ser Asn Val Ser Val Ala His Asp Gly
2785 2790 2795 2800
Ala Gly Lys Arg Val Tyr Tyr Leu Thr Arg Asp Pro Thr Thr Pro Leu
2805 2810 2815

Ala Arg Ala Ala Trp Glu Thr Ala Arg His Thr Pro Val Asn Ser Trp
2820 2825 2830
Leu Gly Asn Ile Ile Met Phe Ala Pro Thr Leu Trp Ala Arg Met Ile
2835 2840 2845
Leu Met Thr His Phe Phe Ser Val Leu Ile Ala Arg Asp Gln Leu Glu
2850 2855 2860
Gln Ala Leu Asn Cys Glu Ile Tyr Gly Ala Cys Tyr Ser Ile Glu Pro
2865 2870 2875 2880
Leu Asp Leu Pro Pro Ile Ile Gln Arg Leu His Gly Leu Ser Ala Phe
2885 2890 2895
Ser Leu His Ser Tyr Ser Pro Gly Glu Ile Asn Arg Val Ala Ala Cys
2900 2905 2910
Leu Arg Lys Leu Gly Val Pro Pro Leu Arg Ala Trp Arg His Arg Ala
2915 2920 2925
Arg Ser Val Arg Ala Arg Leu Leu Ser Arg Gly Gly Arg Ala Ala Ile
2930 2935 2940
Cys Gly Lys Tyr Leu Phe Asn Trp Ala Val Arg Thr Lys Leu Lys Leu
2945 2950 2955 2960
Thr Pro Ile Ala Ala Ala Gly Arg Leu Asp Leu Ser Gly Trp Phe Thr
2965 2970 2975
Ala Gly Tyr Ser Gly Gly Asp Ile Tyr His Ser Val Ser His Ala Arg
2980 2985 2990
Pro Arg Trp Phe Trp Phe Cys Leu Leu Leu Leu Ala Ala Gly Val Gly
2995 3000 3005
Ile Tyr Leu Leu Pro Asn Arg
3010 3015

<210> 11
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> synthetic oligonucleotide

<400> 11
actggacacg gaggtggccg cgtc 24

<210> 12
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> synthetic oligonucleotide

<400> 12
ttgttcttgt cgggttaatg gcgc 24

<210> 13
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> synthetic oligonucleotide

<400> 13
gggtgtacta cacacatgag taag 24

<210> 14
<211> 22

<212> DNA
<213> Artificial Sequence

<220>
<223> synthetic oligonucleotide

<400> 14
aagcgcccct aacttgatga tg 22

<210> 15
<211> 40
<212> DNA
<213> Artificial Sequence

<220>
<223> synthetic oligonucleotide

<400> 15
cgtcatcgat acctcagcgg gcatatgcac tggacacgga 40

<210> 16
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> synthetic oligonucleotide

<400> 16
gtccagtgca tatgcccgct gagg 24

<210> 17
<211> 32
<212> DNA
<213> Artificial Sequence

<220>
<223> synthetic oligonucleotide

<400> 17
catgcaccag ctgatatagc gcttgtaata tg 32

<210> 18
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> synthetic oligonucleotide

<400> 18
tccgtagagg aagcttgcag cctgacgccc 30

<210> 19
<211> 34
<212> DNA
<213> Artificial Sequence

<220>
<223> synthetic oligonucleotide

<400> 19
cagaggaggc agggctgcta tatgtggcaa gtac 34

<210> 20
<211> 34
<212> DNA
<213> Artificial Sequence

<220>
<223> synthetic oligonucleotide

<400> 20
gtacttgcca catatagcag ccctgcctcc tctg 34

<210> 21
<211> 43
<212> DNA
<213> Artificial Sequence

<220>
<223> synthetic oligonucleotide

<400> 21
cgtctctaga caggaaatgg cttaagaggc cggagtgttt acc 43

<210> 22
<211> 65
<212> DNA
<213> Artificial Sequence

<220>
<223> synthetic oligonucleotide

<400> 22
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aatgc 65

<210> 23
<211> 32
<212> DNA
<213> Artificial Sequence

<220>
<223> synthetic oligonucleotide

<400> 23
aggatttgtg ctcatggtgc acggtctacg ag 32

<210> 24
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> synthetic oligonucleotide

<400> 24
tttttttgc ggccgctaat acgactcact atagacccgc ccctaatagg 50

<210> 25
<211> 31
<212> DNA
<213> Artificial Sequence

<220>

<223> synthetic oligonucleotide

<400> 25
ccgtgcacca tgagcacaaa tcctaaacct c 31

<210> 26
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> synthetic oligonucleotide

<400> 26
ggatgtaccc catgaggtcg gcaaag 26

<210> 27
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> synthetic oligonucleotide

<400> 27
gtttgcgcct gcttatggat gctcatcttg 30

<210> 28
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> synthetic oligonucleotide

<400> 28
gcgtcataag catatgcctg ttgggg 26

<210> 29
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> synthetic oligonucleotide

<400> 29
ccctcagcac tggagtacat ctg 23

<210> 30
<211> 39
<212> DNA
<213> Artificial Sequence

<220>
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<400> 30
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<210> 31
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<213> Artificial Sequence

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<400> 31
cgtcccctct tcaatgagag ccgctctaga 30

<210> 32
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<212> DNA
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<220>
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<400> 32
gcggtgaaga ccaagctcaa actcactc 28

<210> 33
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<212> DNA
<213> Artificial Sequence

<220>
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<400> 33
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<210> 34
<211> 38
<212> DNA
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<220>
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<400> 34
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<210> 35
<211> 27
<212> DNA
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<220>
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<400> 35
tacttttgt aggggtaggc cttttcc 27

<210> 36
<211> 34
<212> DNA
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<220>
<223> synthetic oligonucleotide

<400> 36
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<210> 37
<211> 24
<212> DNA
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<220>
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<400> 37
ctatggagtg tagctaatgt gtgc 24

<210> 38
<211> 107
<212> DNA
<213> Artificial Sequence

<220>
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<400> 38
cgtctctaga catgatctgc agagagacca gttacggcac tctctgcagt catgcggctc 60
acggaccttt cacagctagc cgtgactagg gctaagatgg agccacc 107

<210> 39
<211> 45
<212> PRT
<213> Hepatitis C virus

<400> 39
Leu Leu Leu Ala Ala Gly Val Asp Ala Arg Thr His Thr Val Gly Gly
1 5 10 15
Ser Ala Ala Gln Thr Thr Gly Arg Leu Thr Ser Leu Phe Asp Met Gly
20 25 30
Pro Arg Gln Lys Ile Gln Leu Val Asn Thr Asn Gly Ser
35 40 45

<210> 40
<211> 45
<212> PRT
<213> Hepatitis c virus

<400> 40
Leu Leu Leu Ala Ala Gly Val Asp Ala Arg Thr His Thr Val Gly Gly
1 5 10 15
Ser Ala Ala Gln Thr Thr Gly Arg Leu Thr Ser Leu Phe Asp Met Gly
20 25 30
Pro Arg Gln Lys Ile Gln Leu Val Asn Thr Asn Gly Ser
35 40 45

<210> 41
<211> 45
<212> PRT
<213> Hepatitis C virus

<400> 41
Leu Leu Leu Ala Ala Gly Val Asp Ala Arg Thr His Thr Val Gly Gly
1 5 10 15
Ser Ala Ala Gln Thr Thr Gly Arg Leu Thr Ser Leu Phe Asp Met Gly
20 25 30
Pro Arg Gln Lys Ile Gln Leu Val Asn Thr Asn Gly Ser
35 40 45

<210> 42
<211> 45
<212> PRT
<213> Hepatitis C virus

<400> 42
Leu Leu Leu Ala Ala Gly Val Asp Ala Arg Thr His Thr Val Gly Gly
 1   5   10   15
Ser Ala Ala Gln Thr Thr Gly Arg Leu Thr Ser Leu Phe Asp Met Gly
            20   25   30
Pro Arg Gln Lys Ile Gln Leu Val Asn Thr Asn Gly Ser
        35   40   45

<210> 43
<211> 45
<212> PRT
<213> Hepatitis C virus

<400> 43
Leu Leu Leu Ala Ala Gly Val Asp Ala Arg Thr His Thr Val Gly Gly
 1   5   10   15
Ser Ala Ala Gln Thr Thr Gly Arg Leu Thr Ser Leu Phe Asp Met Gly
            20   25   30
Pro Arg Gln Lys Ile Gln Leu Val Asn Thr Asn Gly Ser
        35   40   45

<210> 44
<211> 45
<212> PRT
<213> Hepatitis C virus

<400> 44
Leu Leu Leu Ala Ala Gly Val Asp Ala Arg Thr His Thr Val Gly Gly
 1   5   10   15
Ser Ala Ala Gln Thr Thr Gly Arg Leu Thr Ser Leu Phe Asp Met Gly
            20   25   30
Pro Arg Gln Lys Ile Gln Leu Val Asn Thr Asn Gly Ser
        35   40   45

<210> 45
<211> 45
<212> PRT
<213> Hepatitis C virus

<400> 45
Leu Leu Leu Ala Ala Gly Val Asp Ala Arg Thr His Thr Val Gly Gly
 1   5   10   15
Ser Ala Ala Gln Thr Thr Gly Arg Leu Thr Ser Leu Phe Asp Met Gly
            20   25   30
Pro Arg Gln Lys Ile Gln Leu Val Asn Thr Asn Gly Ser
        35   40   45

<210> 46
<211> 45
<212> PRT
<213> Hepatitis C virus

<400> 46
Leu Leu Leu Ala Ala Gly Val Asp Ala Gln Thr His Thr Val Gly Gly
 1   5   10   15
Ser Ala Ala Gln Thr Thr Gly Arg Leu Thr Ser Leu Phe Asp Met Gly
            20   25   30
Pro Arg Gln Lys Ile Gln Leu Ile Asn Thr Asn Gly Ser
        35   40   45

<210> 47
<211> 45
<212> PRT
<213> Artificial Sequence

<220>
<223> consensus sequence

<400> 47
Leu Leu Leu Ala Ala Gly Val Asp Ala Arg Thr His Thr Val Gly Gly
 1   5   10   15
Ser Ala Ala Gln Thr Thr Gly Arg Leu Thr Ser Leu Phe Asp Met Gly
            20   25   30
Pro Arg Gln Lys Ile Gln Leu Val Asn Thr Asn Gly Ser
        35   40   45

<210> 48
<211> 45
<212> PRT
<213> Hepatitis C virus

<400> 48
Leu Leu Leu Ala Ala Gly Val Asp Ala Gln Thr His Thr Val Gly Gly
 1   5   10   15
Ser Thr Ala His Asn Ala Arg Thr Leu Thr Gly Met Phe Ser Leu Gly
            20   25   30
Ala Arg Gln Lys Ile Gln Leu Ile Asn Thr Asn.Gly Ser
        35   40   45

<210> 49
<211> 360
<212> DNA
<213> Hepatitis C virus

<400> 49
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tcttcacgca gaaagcgtct agccatggcg ttagtatgag tgtcgtgcag cctccaggac 120
ccccccctcc gggagagcca tagtggtctg cggaaccggt gagtacaccg gaattgccag 180
gacgaccggg tcctttcttg gataaacccg ctcaatgcct ggagatttgg gcgtgccccc 240
gcaagactgc tagccgagta gtgttgggtc gcgaaaggcc ttgtggtact gcctgatagg 300
gtgcttgcga gtgccccggg aggtctcgta gaccgtgcac catgagcacg aatcctaaac 360

<210> 50
<211> 360
<212> DNA
<213> Hepatitis C virus

<400> 50
gccagccccc tgatgggggc gacactccac catgaatcac tcccctgtga ggaactactg 60
tcttcacgca gaaagcgtct agccatggcg ttagtatgag tgtcgtgcag cctccaggac 120
ccccccctcc gggagagcca tagtggtctg cggaaccggt gagtacaccg gaattgccgg 180

gaagactggg tcctttcttg gataaacccg ctctatgccc ggccatttgg gcgtgccccc 240
gcaagactgc tagccgagta gcgttgggtt gcgaaaggcc ttgtggtact gcctgatagg 300
gtgcttgcga gtgccccggg aggtctcgta gaccgtgcac catgagcaca aatcctaaac 360

<210> 51
<211> 360
<212> DNA
<213> Hepatitis C virus

<400> 51
gccagccccc tgatgggggc gacactccac catgaatcac tcccctgtga ggaactactg 60
tcttcacgca gaaagcgtct agccatggcg ttagtatgag tgtcgtgcag cctccaggac 120
ccccccctcc gggagagcca tagtggtctg cggaaccggt gagtacaccg gaattgccgg 180
gaagactggg tcctttcttg gataaacccg ctctatgccc ggccatttgg gcgtgccccc 240
gcaagactgc tagccgagta gcgttgggtt gcgaaaggcc ttgtggtact gcctgatagg 300
gtgcttgcga gtgccccggg aggtctcgta gaccgtgcac catgagcaca aatcctaaac 360

<210> 52
<211> 360
<212> DNA
<213> Hepatitis C virus

<400> 52
gccagccccc tgatgggggc gacactccac catgaatcac tcccctgtga ggaactactg 60
tcttcacgca gaaagcgtct agccatggcg ttagtatgag tgtcgtgcag cctccaggac 120
ccccccctcc gggagagcca tagtggtctg cggaaccggt gagtacaccg gaattgccag 180
gacgaccggg tcctttcttg gataaacccg ctcaatgcct ggagatttgg gcgtgccccc 240
gcaagactgc tagccgagta gtgttgggtc gcgaaaggcc ttgtggtact gcctgatagg 300
gtgcttgcga gtgccccggg aggtctcgta gaccgtgcac catgagcaca aatcctaaac 360

<210> 53
<211> 360
<212> DNA
<213> Hepatitis C virus

<400> 53
gccagccccc tgatgggggc gacactccac catgaatcac tcccctgtga ggaactactg 60
tcttcacgca gaaagcgtct agccatggcg ttagtatgag tgtcgtgcag cctccaggac 120
ccccccctcc gggagagcca tagtggtctg cggaaccggt gagtacaccg gaattgccag 180
gacgaccggg tcctttcttg gataaacccg ctcaatgcct ggagatttgg gcgtgccccc 240
gcaagactgc tagccgagta gtgttgggtc gcgaaaggcc ttgtggtact gcctgatagg 300
gtgcttgcga gtgccccggg aggtctcgta gaccgtgcac catgagcaca aatcctaaac 360

<210> 54
<211> 359
<212> DNA
<213> Hepatitis C virus

<400> 54
acccgccccc aataggggcg acactccgcc atgaatcact cccctgtgag gaactactgt 60
cttcacgcag aaagcgtcta gccatggcgt tagtatgagt gtcgtacagc ctccaggccc 120
ccccctcccg ggagagccat agtggtctgc ggaaccggtg agtacaccgg aattgccggg 180
aagactgggt cctttcttgg ataaacccgc tctatgcccg gccatttggg cgtgcccccg 240
caagactgct agccgagtag cgttgggttg cgaaaggcct tgtggtactg cctgataggt 300
tgcttgcgag tgccccggga ggtctcgtag accgtgcacc atgagcacaa atcctaaac 359

<210> 55
<211> 225
<212> DNA

<213> Hepatitis C virus

<400> 55
tgaaggttgg ggtaaacact ccggcctctt aagccatttc ctgyyyyyyy yyyyyyyyyy 60
yyyyyyyyyy yyyyyyyyyy yyyyyyyyyy yyyyyyyyyy yyyyyyyyyy yyyyyyyyyy 120
yyyyaatggt ggctccatct tagccctagt cacggctagc tgtgaaaggt ccgtgagccg 180
catgactgca gagagtgctg atactggcct ctctgcagat catgt 225

<210> 56
<211> 225
<212> DNA
<213> Hepatitis C virus

<400> 56
tgaaggttgg ggtaaacact ccggcctctt aagccatttc ctgyyyyyyy yyyyyyyyyy 60
yyyyyyyyyy yyyyyyyyyy yyyyyyyyyy yyyyyyyyyy yyyyyyyyyy yyyyyyyyyy 120
yyyyaatggt ggctccatct tagccctagt cacggctagc tgtgaaaggt ccgtgagccg 180
catgactgca gagagtgctg atactggcct ctctgcagat catgt 225

<210> 57
<211> 225
<212> DNA
<213> Hepatitis C virus

<400> 57
tgaaggttgg ggtaaacact ccggcctctt aagccatttc ctgyyyyyyy yyyyyyyyyy 60
yyyyyyyyyy yyyyyyyyyy yyyyyyyyyy yyyyyyyyyy yyyyyyyyyy yyyyyyyyyy 120
yyyyaatggt ggctccatct tagccctagt cacggctagc tgtgaaaggt ccgtgagccg 180
catgactgca gagagtgctg atactggcct ctctgcagat catgt 225

<210> 58
<211> 225
<212> DNA
<213> Hepatitis C virus

<400> 58
tgaaggttgg ggtaaacact ccggcctctt aagccatttc ctgyyyyyyy yyyyyyyyyy 60
yyyyyyyyyy yyyyyyyyyy yyyyyyyyyy yyyyyyyyyy yyyyyyyyyy yyyyyyyyyy 120
yyyyaatggt ggctccatct tagccctagt cacggctagc tgtgaaaggt ccgtgagccg 180
catgactgca gagagtgctg atactggcct ctctgcagat catgt 225

<210> 59
<211> 225
<212> DNA
<213> Hepatitis C virus

<400> 59
tgaaggttgg ggtaaacact ccggcctctt aagccatttc ctgyyyyyyy yyyyyyyyyy 60
yyyyyyyyyy yyyyyyyyyy yyyyyyyyyy yyyyyyyyyy yyyyyyyyyy yyyyyyyyyy 120
yyyyaatggt ggctccatct tagccctagt cacggctagc tgtgaaaggt ccgtgagccg 180
catgactgca gagagtgctg atactggcct ctctgcagat catgt 225

<210> 60
<211> 272
<212> DNA
<213> hepatitis C virus

<400> 60
tagagcggca cacattagct acactccata gctaactgtc ccyyyyyyyy yyyyyyyyyy 60
yyyyyyyyyy yyyyyyyyyy yyyyyyyyyy yyyyyyyyyy yyyyyyyyyy yyyyyyyyyy 120
yyyyyyyyyy yyyyyyyyyy yyyyyyyyyy yyyyyyyyyy yyyyyyyyyy yyyyggtggc 180
tccatcttag ccctagtcac ggctagctgt gaaaggtccg tgagccgcat gactgcagag 240
agtgccgtaa ctggtctctc tgcagatcat gt 272

<210> 61
<211> 96
<212> PRT
<213> Hepatitis C virus

<400> 61
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Thr His Gly Leu Val Ser Phe Leu Val Phe Phe Cys Phe Ala Trp Tyr
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Leu Lys Gly Arg Trp Val Pro Gly Ala Val Tyr Ala Leu Tyr Gly Met
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Trp Pro Leu Leu Leu Leu Leu Leu Ala Leu Pro Gln Arg Ala Tyr Ala
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<210> 62
<211> 96
<212> PRT
<213> Hepatitis C virus

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Trp Ser Phe Ser Leu Leu Leu Leu Ala Leu Pro Gln Gln Ala Tyr Ala
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<210> 63
<211> 96
<212> PRT
<213> Hepatitis C virus

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Thr His Gly Leu Val Ser Phe Leu Val Phe Phe Cys Phe Ala Trp Tyr
        35   40   45
Leu Lys Gly Arg Trp Val Pro Gly Ala Val Tyr Ala Leu Tyr Gly Met
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Trp Pro Leu Leu Leu Leu Leu Leu Ala Leu Pro Gln Arg Ala Tyr Ala
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<210> 64
<211> 96

<212> PRT
<213> Hepatitis C virus

<400> 64
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        35   40   45
Ile Lys Gly Arg Val Val Pro Leu Ala Thr Tyr Ser Leu Thr Gly Leu
    50   55   60
Trp Ser Phe Ser Leu Leu Leu Leu Ala Leu Pro Gln Gln Ala Tyr Ala
65   70   75   80
Leu Asp Thr Glu Val Ala Ala Ser Cys Gly Gly Val Val Leu Val Gly
                85   90   95

<210> 65
<211> 96
<212> PRT
<213> Hepatitis C virus

<400> 65
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            20   25   30
Thr His Gly Leu Val Ser Phe Leu Val Phe Phe Cys Phe Ala Trp Tyr
        35   40   45
Leu Lys Gly Arg Trp Val Pro Gly Ala Val Tyr Ala Leu Tyr Gly Met
    50   55   60
Trp Pro Leu Leu Leu Leu Leu Leu Ala Leu Pro Gln Arg Ala Tyr Ala
65   70   75   80
Leu Asp Thr Glu Val Ala Ala Ser Cys Gly Gly Val Val Leu Val Gly
                85   90   95

<210> 66
<211> 96
<212> PRT
<213> Hepatitis C virus

<400> 66
Arg Val Cys Ala Cys Leu Trp Met Leu Ile Leu Leu Gly Gln Ala Glu
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Ala Ala Leu Glu Lys Leu Val Ile Leu His Ala Ala Ser Ala Ala Ser
            20   25   30
Cys Asn Gly Phe Leu Tyr Phe Val Ile Phe Phe Val Ala Ala Trp Tyr
        35   40   45
Ile Lys Gly Arg Val Val Pro Leu Ala Thr Tyr Ser Leu Thr Gly Leu
    50   55   60
Trp Ser Phe Ser Leu Leu Leu Leu Ala Leu Pro Gln Gln Ala Tyr Ala
65   70   75   80
Tyr Asp Ala Ser Val His Gly Gln Ile Gly Ala Ala Leu Leu Val Met
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<210> 67
<211> 9599
<212> DNA
<213> Hepatitis C virus

<400> 67

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<210> 68
<211> 3011
<212> PRT
<213> Hepatitis C Virus

<400> 68

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Val Pro Ala Lys Ser Val Cys Gly Pro Val Tyr Cys Phe Thr Pro Ser
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Pro Val Val Val Gly Thr Thr Asp Arg Ser Gly Ala Pro Thr Tyr Ser
        515                 520                 525
Trp Gly Ala Asn Asp Thr Asp Val Phe Val Leu Asn Asn Thr Arg Pro
    530                 535                 540
Pro Leu Gly Asn Trp Phe Gly Cys Thr Trp Met Asn Ser Thr Gly Phe
545                 550                 555                 560
Thr Lys Val Cys Gly Ala Pro Pro Cys Val Ile Gly Gly Val Gly Asn
                565                 570                 575
Asn Thr Leu Leu Cys Pro Thr Asp Cys Phe Arg Lys His Pro Glu Ala
            580                 585                 590
Thr Tyr Ser Arg Cys Gly Ser Gly Pro Trp Ile Thr Pro Arg Cys Met
        595                 600                 605
Val Asp Tyr Pro Tyr Arg Leu Trp His Tyr Pro Cys Thr Ile Asn Tyr
    610                 615                 620
Thr Ile Phe Lys Val Arg Met Tyr Val Gly Gly Val Glu His Arg Leu
625                 630                 635                 640
Glu Ala Ala Cys Asn Trp Thr Arg Gly Glu Arg Cys Asp Leu Glu Asp
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Arg Asp Arg Ser Glu Leu Ser Pro Leu Leu Leu Ser Thr Thr Gln Trp
            660                 665                 670
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Gln Val Leu Pro Cys Ser Phe Thr Thr Leu Pro Ala Leu Ser Thr Gly
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Leu Ile His Leu His Gln Asn Ile Val Asp Val Gln Tyr Leu Tyr Gly
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Val Gly Ser Ser Ile Ala Ser Trp Ala Ile Lys Trp Glu Tyr Val Val
705                 710                 715                 720
Leu Leu Phe Leu Leu Leu Ala Asp Ala Arg Val Cys Ser Cys Leu Trp
                725                 730                 735
Met Met Leu Leu Ile Ser Gln Ala Glu Ala Ala Leu Glu Asn Leu Val
            740                 745                 750
Ile Leu Asn Ala Ala Ser Leu Ala Gly Thr His Gly Leu Val Ser Phe
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Leu Val Phe Phe Cys Phe Ala Trp Tyr Leu Lys Gly Arg Trp Val Pro
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Gly Ala Val Tyr Ala Leu Tyr Gly Met Trp Pro Leu Leu Leu Leu Leu
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Ser Cys Gly Gly Val Val Leu Val Gly Leu Met Ala Leu Thr Leu Ser
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Pro Tyr Tyr Lys Arg Tyr Ile Ser Trp Cys Met Trp Trp Leu Gln Tyr
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Phe Leu Thr Arg Val Glu Ala Gln Leu His Val Trp Val Pro Pro Leu
    850                 855                 860
Asn Val Arg Gly Gly Arg Asp Ala Val Ile Leu Leu Met Cys Val Val
865                 870                 875                 880
His Pro Thr Leu Val Phe Asp Ile Thr Lys Leu Leu Leu Ala Ile Phe
                885                 890                 895
Gly Pro Leu Trp Ile Leu Gln Ala Ser Leu Leu Lys Val Pro Tyr Phe
            900                 905                 910
Val Arg Val Gln Gly Leu Leu Arg Ile Cys Ala Leu Ala Arg Lys Ile
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Ala Gly Gly His Tyr Val Gln Met Ala Ile Ile Lys Leu Gly Ala Leu
    930                 935                 940
Thr Gly Thr Tyr Val Tyr Asn His Leu Thr Pro Leu Arg Asp Trp Ala
945                 950                 955                 960
His Asn Gly Leu Arg Asp Leu Ala Val Ala Val Glu Pro Val Val Phe
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Ser Arg Met Glu Thr Lys Leu Ile Thr Trp Gly Ala Asp Thr Ala Ala
            980                 985                 990
Cys Gly Asp Ile Ile Asn Gly Leu Pro Val Ser Ala Arg Arg Gly Gln
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Glu Ile Leu Leu Gly Pro Ala Asp Gly Met Val Ser Lys Gly Trp Arg
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Leu Leu Ala Pro Ile Thr Ala Tyr Ala Gln Gln Thr Arg Gly Leu Leu
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Gly Cys Ile Ile Thr Ser Leu Thr Gly Arg Asp Lys Asn Gln Val Glu
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Gly Glu Val Gln Ile Val Ser Thr Ala Thr Gln Thr Phe Leu Ala Thr
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Cys Ile Asn Gly Val Cys Trp Thr Val Tyr His Gly Ala Gly Thr Arg
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Asp Gln Asp Leu Val Gly Trp Pro Ala Pro Gln Gly Ser Arg Ser Leu
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Thr Pro Cys Thr Cys Gly Ser Ser Asp Leu Tyr Leu Val Thr Arg His
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Ala Asp Val Ile Pro Val Arg Arg Arg Gly Asp Ser Arg Gly Ser Leu
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Leu Leu Cys Pro Ala Gly His Ala Val Gly Leu Phe Arg Ala Ala Val
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Pro Ala Val Pro Gln Ser Phe Gln Val Ala His Leu His Ala Pro Thr
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Gly Ser Gly Lys Ser Thr Lys Val Pro Ala Ala Tyr Ala Ala Gln Gly
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Tyr Lys Val Leu Val Leu Asn Pro Ser Val Ala Ala Thr Leu Gly Phe
    1250                1255                1260
Gly Ala Tyr Met Ser Lys Ala His Gly Val Asp Pro Asn Ile Arg Thr
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Gly Lys Phe Leu Ala Asp Gly Gly Cys Ser Gly Gly Ala Tyr Asp Ile
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Ile Ile Cys Asp Glu Cys His Ser Thr Asp Ala Thr Ser Ile Leu Gly
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Ile Gly Thr Val Leu Asp Gln Ala Glu Thr Ala Gly Ala Arg Leu Val
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Val Leu Ala Thr Ala Thr Pro Pro Gly Ser Val Thr Val Ser His Pro
1345                1350                1355                1360
Asn Ile Glu Glu Val Ala Leu Ser Thr Thr Gly Glu Ile Pro Phe Tyr
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Gly Lys Ala Ile Pro Leu Glu Val Ile Lys Gly Gly Arg His Leu Ile
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Phe Cys His Ser Lys Lys Lys Cys Asp Glu Leu Ala Ala Lys Leu Val
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Ala Leu Gly Ile Asn Ala Val Ala Tyr Tyr Arg Gly Leu Asp Val Ser
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Val Ile Pro Thr Ser Gly Asp Val Val Val Val Ser Thr Asp Ala Leu
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Met Thr Gly Phe Thr Gly Asp Phe Asp Ser Val Ile Asp Cys Asn Thr
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Cys Val Thr Gln Thr Val Asp Phe Ser Leu Asp Pro Thr Phe Thr Ile
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Glu Thr Thr Thr Leu Pro Gln Asp Ala Val Ser Arg Thr Gln Arg Arg
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Gly Arg Thr Gly Arg Gly Lys Pro Gly Ile Tyr Arg Phe Val Ala Pro
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Tyr Asp Ala Gly Cys Ala Trp Tyr Glu Leu Thr Pro Ala Glu Thr Thr
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Val Arg Leu Arg Ala Tyr Met Asn Thr Pro Gly Leu Pro Val Cys Gln
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Asp His Leu Glu Phe Trp Glu Gly Val Phe Thr Gly Leu Thr His Ile
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Thr Leu His Gly Pro Thr Pro Leu Leu Tyr Arg Leu Gly Ala Val Gln
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Gly Val Leu Ala Ala Leu Ala Ala Tyr Cys Leu Ser Thr Gly Cys Val
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Trp Ala Lys His Met Trp Asn Phe Ile Ser Gly Ile Gln Tyr Leu Ala
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Pro Gly Ala Leu Val Val Gly Val Val Cys Ala Ala Ile Leu Arg Arg
1890 1895 1900
His Val Gly Pro Gly Glu Gly Ala Val Gln Trp Met Asn Arg Leu Ile
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Ala Phe Ala Ser Arg Gly Asn His Val Ser Pro Thr His Tyr Val Pro
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Glu Ser Asp Ala Ala Ala Arg Val Thr Ala Ile Leu Ser Ser Leu Thr
1940 1945 1950
Val Thr Gln Leu Leu Arg Arg Leu His Gln Trp Ile Ser Ser Glu Cys
1955 1960 1965
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1970 1975 1980
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2675 2680 2685

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Gly Asp Asp Leu Val Val Ile Cys Glu Ser Ala Gly Val Gln Glu Asp
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Pro Pro Gly Asp Pro Pro Gln Pro Glu Tyr Asp Leu Glu Leu Ile Thr
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Val Tyr Tyr Leu Thr Arg Asp Pro Thr Thr Pro Leu Ala Arg Ala Ala
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Trp Glu Thr Ala Arg His Thr Pro Val Asn Ser Trp Leu Gly Asn Ile
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Pro Ile Ile Gln Arg Leu His Gly Leu Ser Ala Phe Ser Leu His Ser
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Gly Gly Asp Ile Tyr His Ser Val Ser His Ala Arg Pro Arg Trp Phe
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<400> 69

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<211> 3010
<212> PRT
<213> Hepatitis C virus

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            20   25   30
Gly Val Tyr Leu Leu Pro Arg Arg Gly Pro Arg Leu Gly Val Arg Ala
        35   40   45
Thr Arg Lys Thr Ser Glu Arg Ser Gln Pro Arg Gly Arg Arg Gln Pro
    50   55   60
Ile Pro Lys Ala Arg Arg Pro Glu Gly Arg Ala Trp Ala Gln Pro Gly
65   70   75   80
Tyr Pro Trp Pro Leu Tyr Gly Asn Glu Gly Leu Gly Trp Ala Gly Trp
                85   90   95
Leu Leu Ser Pro Arg Gly Ser Arg Pro Ser Trp Gly Pro Thr Asp Pro
            100   105   110
Arg Arg Arg Ser Arg Asn Leu Gly Lys Val Ile Asp Thr Leu Thr Cys
        115   120   125
Gly Phe Ala Asp Leu Met Gly Tyr Ile Pro Leu Val Gly Ala Pro Leu
    130   135   140
Gly Gly Ala Ala Arg Ala Leu Ala His Gly Val Arg Val Leu Glu Asp
145   150   155   160
Gly Val Asn Tyr Ala Thr Gly Asn Leu Pro Gly Cys Ser Phe Ser Ile
                165   170   175
Phe Leu Leu Ala Leu Leu Ser Cys Leu Thr Ile Pro Ala Ser Ala Tyr
            180   185   190
Glu Val Arg Asn Val Ser Gly Ile Tyr His Val Thr Asn Asp Cys Ser
        195   200   205
Asn Ser Ser Ile Val Tyr Glu Ala Ala Asp Val Ile Met His Thr Pro
    210   215   220
Gly Cys Val Pro Cys Val Arg Glu Gly Asn Ser Ser Arg Cys Trp Val
225   230   235   240
Ala Leu Thr Pro Thr Leu Ala Ala Arg Asp Ala Ser Val Pro Thr Thr
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Thr Ile Arg Arg His Val Asp Leu Leu Val Gly Thr Ala Ala Phe Cys
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Ser Ala Met Tyr Val Gly Asp Leu Cys Gly Ser Ile Phe Leu Val Ser

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Trp Gly Val Leu Ala Gly Leu Ala Tyr Tyr Ser Met Val Gly Asn Trp
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Val Asp Tyr Pro Tyr Arg Leu Trp His Tyr Pro Cys Thr Leu Asn Phe
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Ser Ile Phe Lys Val Arg Met Tyr Val Gly Gly Val Glu His Arg Leu
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Arg Asp Arg Ser Glu Leu Ser Pro Leu Leu Leu Ser Thr Thr Glu Trp
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Gln Ile Leu Pro Cys Ala Phe Thr Thr Leu Pro Ala Leu Ser Thr Gly
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Leu Ile His Leu His Gln Asn Ile Val Asp Val Gln Tyr Leu Tyr Gly
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Val Gly Ser Ala Phe Val Ser Phe Ala Ile Lys Trp Glu Tyr Ile Leu
705                 710                 715                 720
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Met Met Leu Leu Ile Ala Gln Ala Glu Ala Ala Leu Glu Asn Leu Val
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Pro Tyr Tyr Lys Val Phe Leu Thr Arg Leu Ile Trp Trp Leu Gln Tyr
        835                 840                 845
Phe Ile Thr Arg Ala Glu Ala His Met Gln Val Trp Val Pro Pro Leu
    850                 855                 860
Asn Val Arg Gly Gly Arg Asp Ala Ile Ile Leu Leu Thr Cys Ala Val
865                 870                 875                 880
His Pro Glu Leu Ile Phe Asp Ile Thr Lys Leu Leu Leu Ala Ile Leu
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Gly Pro Leu Met Val Leu Gln Ala Gly Ile Thr Arg Val Pro Tyr Phe
            900                 905                 910
Val Arg Ala Gln Gly Leu Ile Arg Ala Cys Met Leu Val Arg Lys Val
        915                 920                 925
Ala Gly Gly His Tyr Val Gln Met Ala Phe Met Lys Leu Gly Ala Leu
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Thr Gly Thr Tyr Val Tyr Asn His Leu Thr Pro Leu Arg Asp Trp Ala
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Cys Thr Arg Gly Val Ala Lys Ala Val Asp Phe Ile Pro Val Glu Ser
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Tyr Lys Val Leu Val Leu Asn Pro Ser Val Ala Ala Thr Leu Gly Phe
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1940 1945 1950
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Ser Ile Tyr Gln Cys Cys Asp Leu Ala Pro Glu Ala Arg Gln Ala Ile
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Arg Ser Leu Thr Glu Arg Leu Tyr Ile Gly Gly Pro Leu Thr Asn Ser
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Lys Gly Gln Asn Cys Gly Tyr Arg Arg Cys Arg Ala Ser Gly Val Leu
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        2755                2760                2765
Pro Gly Asp Pro Pro Gln Pro Glu Tyr Asp Leu Glu Leu Ile Thr Ser
    2770                2775                2780
Cys Ser Ser Asn Val Ser Val Ala His Asp Ala Ser Gly Lys Arg Val
2785                2790                2795                2800
```

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Tyr Tyr Leu Thr Arg Asp Pro Thr Thr Pro Leu Ala Arg Ala Ala Trp
                2805                2810                2815
Glu Thr Ala Arg His Thr Pro Ile Asn Ser Trp Leu Gly Asn Ile Ile
            2820                2825                2830
Met Tyr Ala Pro Thr Leu Trp Ala Arg Met Ile Leu Met Thr His Phe
        2835                2840                2845
Phe Ser Ile Leu Leu Ala Gln Glu Gln Leu Glu Lys Ala Leu Asp Cys
    2850                2855                2860
Gln Ile Tyr Gly Ala Cys Tyr Ser Ile Glu Pro Leu Asp Leu Pro Gln
2865                2870                2875                2880
Ile Ile Glu Arg Leu His Gly Leu Ser Ala Phe Thr Leu His Ser Tyr
                2885                2890                2895
Ser Pro Gly Glu Ile Asn Arg Val Ala Ser Cys Leu Arg Lys Leu Gly
            2900                2905                2910
Val Pro Pro Leu Arg Thr Trp Arg His Arg Ala Arg Ser Val Arg Ala
        2915                2920                2925
Lys Leu Leu Ser Gln Gly Gly Arg Ala Ala Thr Cys Gly Arg Tyr Leu
    2930                2935                2940
Phe Asn Trp Ala Val Arg Thr Lys Leu Lys Leu Thr Pro Ile Pro Ala
2945                2950                2955                2960
Ala Ser Gln Leu Asp Leu Ser Gly Trp Phe Val Ala Gly Tyr Ser Gly
                2965                2970                2975
Gly Asp Ile Tyr His Ser Leu Ser Arg Ala Arg Pro Arg Trp Phe Pro
            2980                2985                2990
Leu Cys Leu Leu Leu Leu Ser Val Gly Val Gly Ile Tyr Leu Leu Pro
        2995                3000                3005
Asn Arg
    3010
```